



Just the Facts...

Solvents - Medical

GENERAL INFORMATION	<p>A solvent is usually a liquid that is used to dissolve another substance and form a solution. When the term “solvent” is used, it generally refers to an “organic” solvent –or group of chemicals that dissolve organic (carbon-containing) compounds. Water is also a solvent and it is frequently called the “universal solvent”. Although water dissolves many inorganic chemicals, by itself, it is a poor solvent for organic compounds. To aid in dissolving or cleaning organic materials, a soap or detergent is used with the water. Water, heated water, and water with detergent or soap, can also cause loss of skin fats and oil resulting in skin irritation and lesions. Although this fact sheet addresses primarily “organic” solvents, water and water-based solvent products must be considered when evaluating an individual for dermatitis or other possible solvent-related conditions.</p> <p>Volatile solvents evaporate forming “vapors”—not “fumes”. Vapors are gases that cannot be removed from the air by simple filtration. Fumes are very small particles that can be filtered from the air. The selection of a respirator or respirator cartridge/ canister depends on whether a vapor or a fume is present! Inhalation of solvent vapors can result in toxic effects if the concentration and duration of exposure is excessive. Solvents vary widely in their toxicity, but generally, less toxic solvents are often selected for use in military applications. Solvents are often used as mixtures of two or more different chemicals—mixing the solvents’ properties, as well as, the potential toxic effects. Solvents may be flammable and can burn or explode. The air concentrations at which solvents can explode (lower explosive limit) are many times greater than those presenting acute and chronic health hazards.</p>
ROUTINE USES IN THE DEPLOYED SETTING	<p>Solvents are used in the cleaning of weapons, metal objects, and electronic parts; in pressure washers and steam cleaners; in solutions for pesticides, paints, and lubricants; and as refrigerants; degreasers; coolants; and adhesives.</p>
PERSONAL PROTECTIVE EQUIPMENT and COUNTERMEASURES FOR DEPLOYED PERSONNEL	<p>Eye contact from splashed solvents can be prevented by the use of safety glasses, goggles, or a face-shield.</p> <p>Although occasional skin contact with some mild organic solvents will not result in harmful effects, repeated skin contact must be prevented by using either gloves or a barrier cream. Skin areas in contact with solvents should be washed with water and a mild soap, and then well-dried. An emollient skin cream can be used to replace the fats and oils removed by the solvent.</p> <p>Inhalation of solvents can be controlled with local exhaust ventilation or general ventilation (an open area with moving fresh air), or an appropriate respirator should be worn. Solvents should not be used in confined areas as the vapor level may become extremely high or even explosive.</p>
QUESTIONS TO ASK REGARDING EXPOSURE	<ul style="list-style-type: none">• How frequently did individual come into direct contact with a solvent, or inhaled solvent vapors? What was that solvent and are there exposure data?• Did individual have any acute effects from solvent exposure: irritation of skin, eye, nose, lungs; erythema, rash, or lesion at site of contact (is/was lesion bilateral); cough or difficulty breathing; difficulty in concentrating or in manual dexterity; “inebriation” or loss of consciousness?• Does individual have chronic effects that are possibly related to solvent exposure? What is this relationship?
EXPOSURE LEVELS HISTORICALLY ENCOUNTERED	<p>DATA IF AVAILABLE: Solvent exposures can occur from a very wide range of chemicals, liquid concentrations, and air levels. The evaporation of the solvent and the resulting airborne level depends upon factors that are independent of the specific solvent, such as room size, airflow, temperature, surface area, solvent agitation or mechanical movement, as well as, many others! These data are important in assessing potential solvent exposure.</p> <p>Even if the airborne solvent concentration is low, direct skin contact can result in significant absorption and systemic effects.</p>
AVAILABLE EXPOSURE DATA	<p>DATA IF AVAILABLE: Check for both general environmental levels and personal sampling levels. If exposure data are not available, ASK questions concerning potential exposure to solvents, fuels, exhaust gases, etc.).</p>

<p>COMMON ACUTE AND CHRONIC HEALTH EFFECTS</p>	<p><u>Acute effects (short-term exposures):</u></p> <ul style="list-style-type: none"> • Rapid signs and symptoms of CNS toxicity are common with exposures to high concentrations of organic solvents. Clinical findings vary from solvent to solvent; however, disorientation, giddiness, dizziness, euphoria, and confusion progressing to unconsciousness, paralysis, convulsions, and death from respiratory or cardiovascular arrest can occur. • Direct eye contact or moderate solvent vapor exposure will often cause burning and tearing. If continued, eyes will feel dry or become injected. • Skin contact with an organic solvent can result in loss of the protective fats and oils in the skin. There are differences in how fast this happens, but prolonged contact with any solvent can irritate or damage the skin. This causes the appearance of irritation, erythema, rash, or other skin lesion at the site of contact. • Upon cessation of exposure, symptoms abate in the vast majority of patients. <p><u>Chronic effects (short-term and long-term exposures):</u></p> <ul style="list-style-type: none"> • Clinical changes may be slower in onset and difficult to associate with a chemical exposure. • Headache, fatigue, sleep disturbances, muscle and joint aches, numbness, tingling, mood changes, and other generalized symptoms may occur. • Frequently, no specific event or incident is clearly responsible.
<p>REVERSIBILITY OF HEALTH EFFECTS</p>	<p>After stopping skin contact or inhalation exposure, the effects of the solvent generally disappear with the elimination of the solvent. Volatile solvents are commonly excreted via the lungs. This may result in a telltale odor on the breath during the first several hours following termination of exposure. Exposed individuals generally feel much better soon after inhalation exposure is stopped and they are moved to fresh air. The effects of inhalation exposure may take several hours to completely disappear based upon the solvent and the length of time that it was inhaled. Some solvents (methylene chloride) sequester into body fat and have a prolonged elimination time with chronic exposure.</p> <p>Skin burns can occur with prolonged skin contact. Rapidly evaporating solvents can freeze the skin. Lesions of either type require appropriate treatment.</p> <p>In rare instances of short exposures to very high solvent levels, or long term, repeated exposure to moderate or high solvent levels, permanent damage to the central nervous system can occur.</p> <p>Specific compounds used in solvent applications may have unique chronic or delayed toxicity. Industrial and military use has moved away from these chemicals, but they may possibly be procured and used overseas. Consult with Preventive Medicine personnel.</p>
<p>TREATMENT REQUIRED/AVAILABLE FOR TOXIC EFFECTS</p>	<p>The immediate treatment for any solvent exposure is to stop the exposure (irrigate eyes, rinse skin, move to fresh air) when effects occur. For acute situations, symptomatic treatment is usually the mainstay of medical care. After emergent issues are taken care of, reducing the intensity or eliminating exposure altogether is the appropriate goal of the clinician.</p> <p>Generally, there is no medical treatment required for past routine exposure. Studies of workers chronically exposed to a variety of solvents have conflicting results.</p>
<p>LONG TERM MEDICAL SURVEILLANCE REQUIREMENTS OF HEALTH EFFECTS MONITORING</p>	<p>Solvent levels can be measured in the body during and shortly (within a few days) after exposure. There is no long-term medical follow-up for routine solvent exposure.</p> <p>In very rare cases where chronic CNS or PNS, or respiratory sequelae are suspected, neuropsychological testing/evaluation, or pulmonary testing/evaluation, respectively, is recommended.</p>
<p>SPECIAL RISK COMMUNICATION ISSUES</p>	<p>Most skin exposures to commonly used military solvents result in mild dermatologic conditions that readily reverse with prevention of contact and topical treatment.</p> <p>In rare cases, where acute solvent exposure resulted in significant respiratory problems or a loss of consciousness, there may be permanent respiratory or central nervous system effects. Planned follow-up after a severe exposure is necessary.</p>